Anatomy of a Global Trigger List

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High Level Trigger Jamboree
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Trigger Fundamentals

- Effect of the 'Trigger' system
  - given over a million opportunities for collisions ('events' per second)
  - choose <50 to record for later analysis
- Selecting events:
  - Some fraction of these events are not 'rare' (but still useful):
    - Low energy jet production via QCD …
    - Measure luminosity …
    - Detector monitoring …
  - The study of rare processes and the discovery of unknown phenomena require maximal 'exposure' to the beam
    - Need well designed triggers that can remain unprescaled at the highest luminosity
- The trigger system is designed to
  - Record the wide variety of processes that D0 physicists are interested in looking at
  - It does this using a 'trigger menu' (or Trigger List)which is complex by necessity

Trigger System Design

- Fast, complex, high rate,…,multi-level
  - Level 1 - electronics and firmware
    - reduce 1 MHz to 10 kHz by looking for interesting signatures (high Pt tracks, high Et energy deposition)
  - Level 2 - firmware and software
    - 10 kHz to 1kHz by refining L1 objects, match objects found by different detectors
  - Level 3 - software
    - 1kHz to 50 Hz - execute streamlined versions of offline reconstruction programs to select events.
- Programmable !
  - through the ‘trigger configuration’ generated from Trigger Lists stored in the Trigger Database
  - and online resource allocation by COOR

Trigger Database Purpose

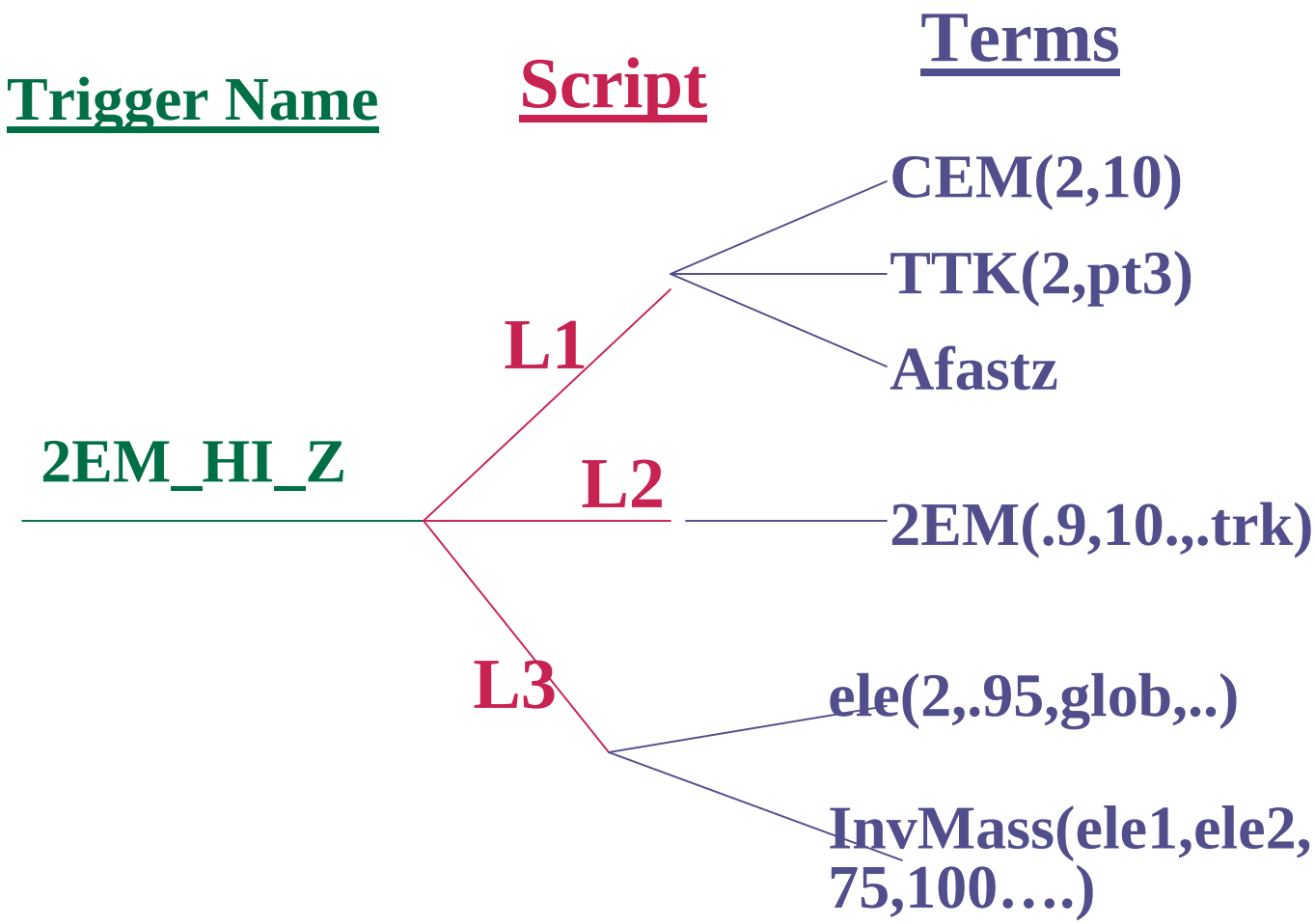
- **Generate**:
  - precise programming for trigger configuration
    - ONLINE
    - SIMULATION
  - The configuration format: ‘xml’
    - Extensible Markup Language (XML) universal format for structured docs and data on the web
    - The trigger ‘xml’ does not contain all the information stored in the trigger database, specifically wrt versioning, how one trigger list relates to another triggerlist, or descriptions.
- **Store**
  - all global Trigger Lists used online in Run 2
  - Bench march Trigger Lists for simulation
- **Report**
  - trigger configuration settings
    - for use by offline analysis programs
      - Et thresholds, eta ranges ...
    - to the collaboration (web), with some documentation features
      - not intended as a substitute for trigger subsystem documentation !

Trigger Database Implementation

- **Design**:
  - Three levels of decision making
    - Level 1 - hardware, firmware
    - Level 2 - firmware, software
    - Level 3 - software
  - complexity is a reflection of the complexity of the trigger
  - symmetry/commonality is taken advantage of wherever possible
  - seemingly cryptic nomenclature reflective of trigger programming.
- **Implementation**:
  - IN USE for all global trigger configurations since December 2001
- **Documentation**:
  - Specifications from
    - COOR document (Scott Snyder)
    - D0 Trigger/Online Groups
  - Trigger Database
    - see Entry Interface 'help' button

A Trigger is a Logical Condition

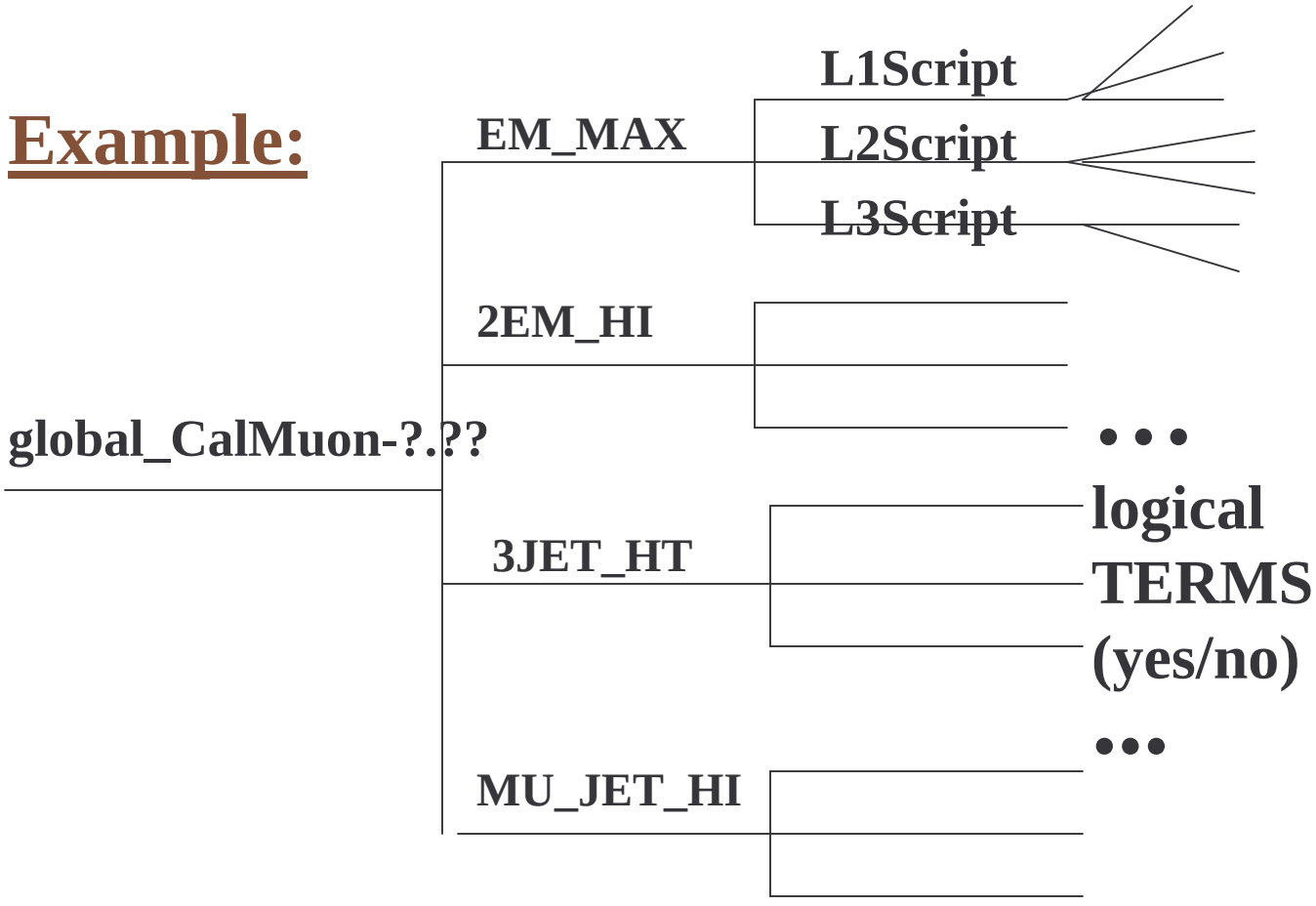
- identified by a **trigger name**
- with a set of criteria called a Script at Level 1, Level 2, and Level 3
  - > each of which is satisfied if all of its logical conditions or **TERMS** is satisfied
- satisfied (true) for an event if all 3 Level Scripts are true for that event



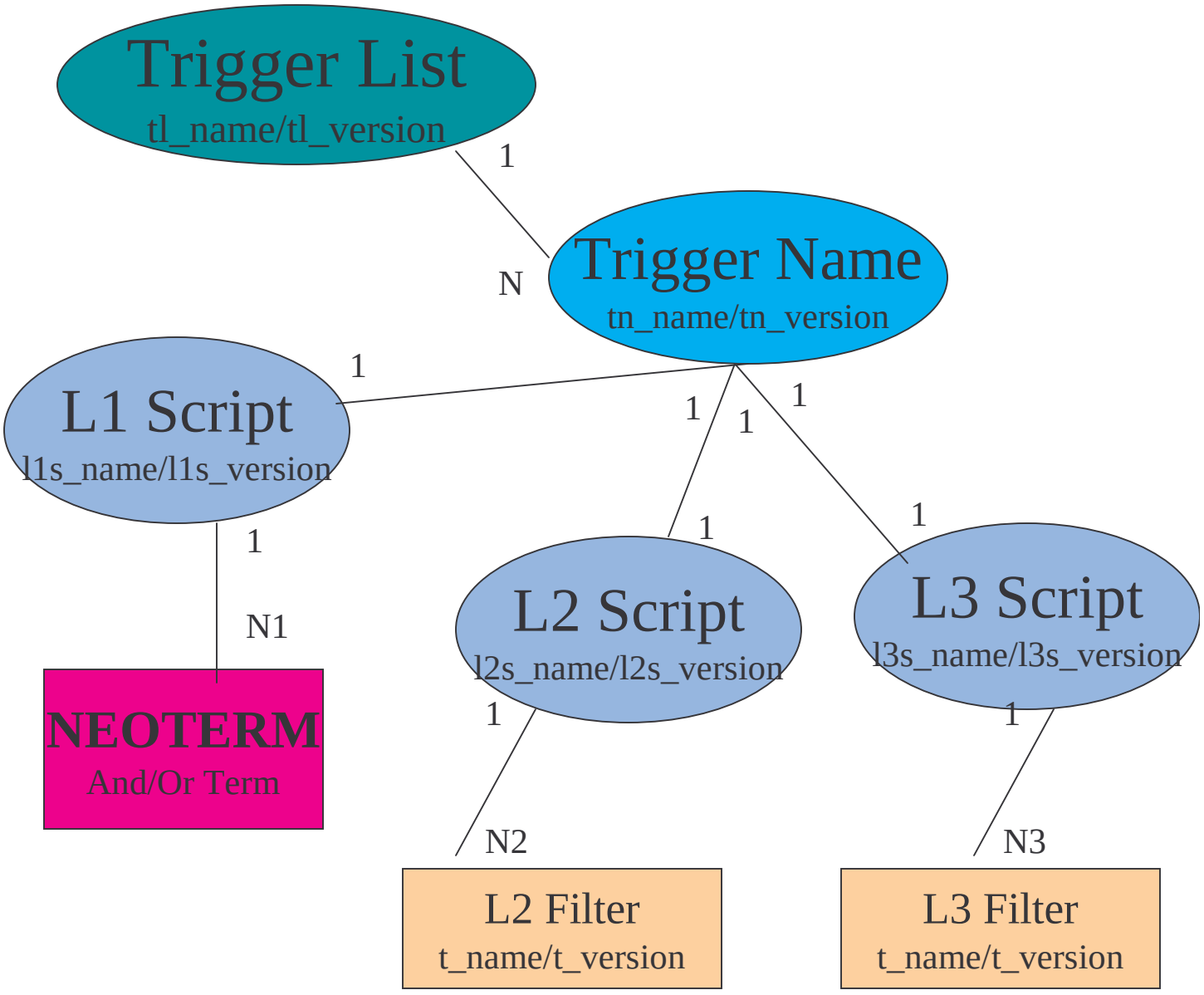
A Trigger List

- identified by Triggerlist Name/Version
- contains one or more triggers
- like a tree with Triggers as branches
  - if any trigger is satisfied, the event is recorded and the trigger bit for that trigger name is set to TRUE in the event record

Example:



Trigger Database Design



NAME/VERSION scheme is repeated throughout the design. The name is intended to reflect the conditions in that definition

Trigger Nomenclature – L1

- NEOTYPE – an L1 detector class
  - Group NEOTERMS which shares common download mechanisms
    - Examples: ctt, fpd, fps, muo, emcount, jetcount … specterm
- NEOTERM – the "And/Or terms"
  - For any event: result is TRUE or FALSE
  - Map into the L1 And/Or Framework
  - Combine one/more to form a Level 1 Script decision
    - Examples: TTK(1,1.5), Afastz …
- L1 Script decision
  - Logical AND of one/more NEOTERMS

Level 1 Trigger Systems

C -- Calorimeter -- based on Calorimeter "trigger towers"

- emcount / CEM(n,Et[,Hv]) – Cal EM TTower
- jetcount / CJT(n,Et) – Cal Jet (tot) TTower
- misspt / CME(MEt) – near future

M -- MUON – based on Muon system scintillator, PDT,MDT and CFT

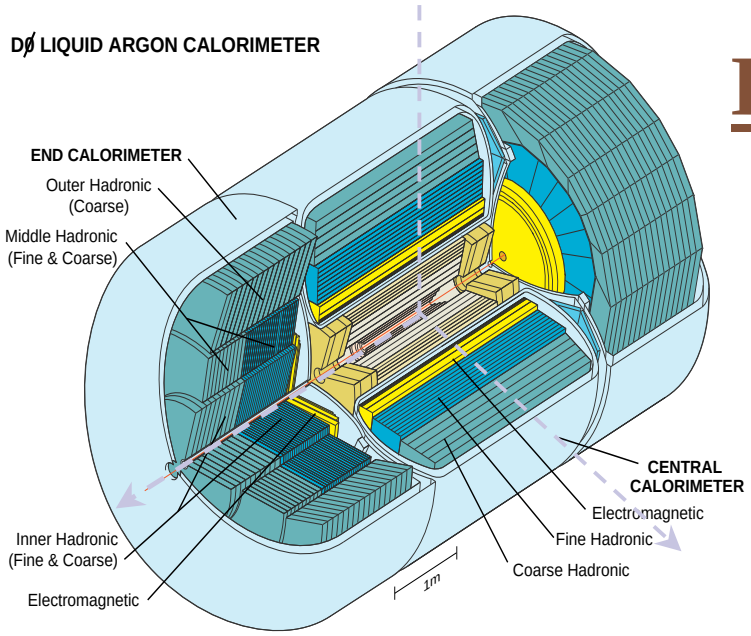
- muo / MUO(n,Pt,eta,scint,wire,option)

T -- CFT/CPS

- ctt / TTK(n,p) – CFT track
- ctt / TIS(n,p) -- Isolated track
- ctt / TIQ(n,p,q) -- Isolated tracks in a quadrant
- ctt / TIL - Isolated track(s) with low home-sector occupancy.

A -- Special (L1 Framework terms)

– constructed from signals from: the Accelerator, Luminosity Monitor, Trigger Timing and Control
  - Afastz, ALiveBX, ASkip0 …



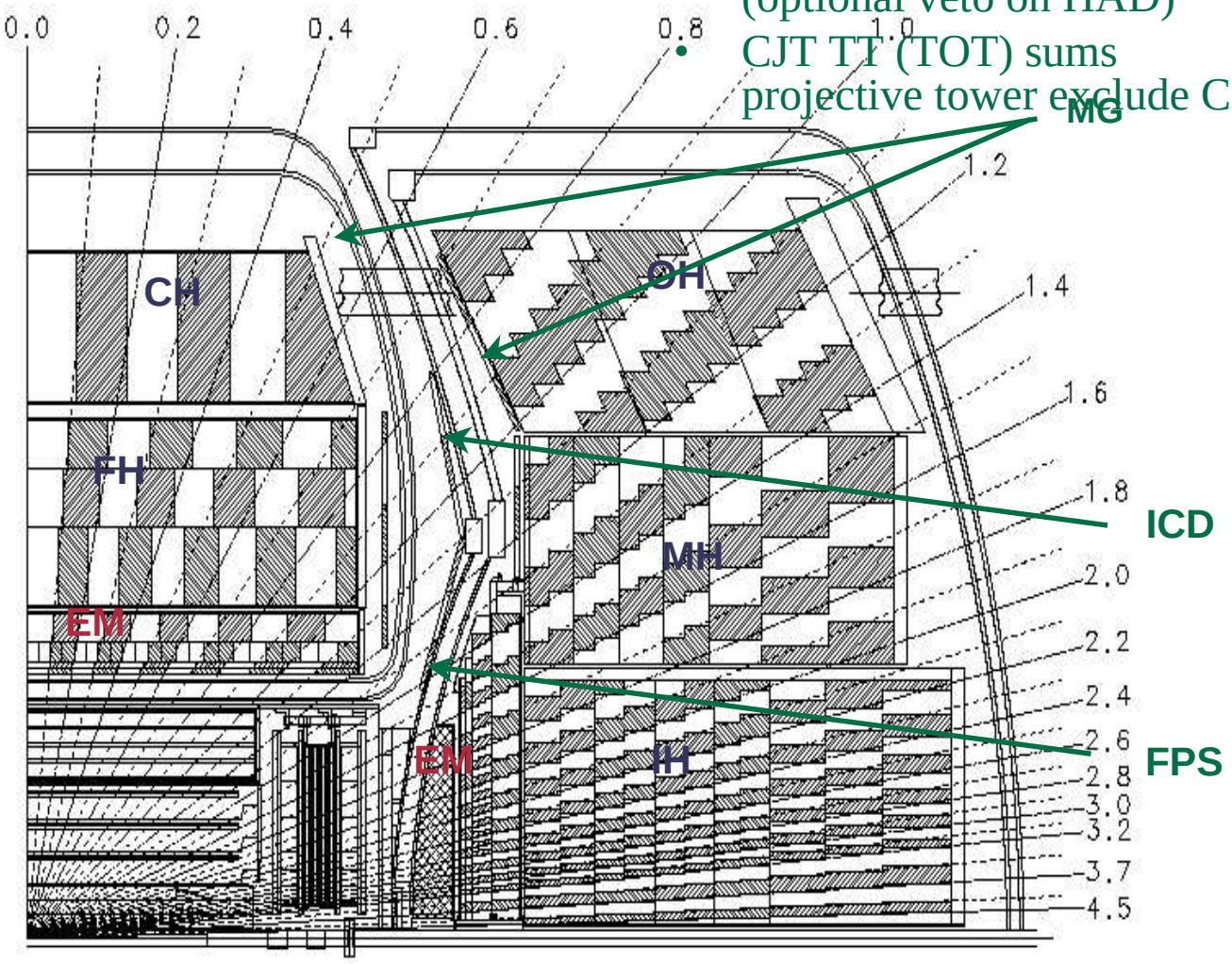
DØ: Calorimetry

Features

- Projective geometry
- Cell size: 0.1 x 0.1 in eta x phi

L1 Cal Trigger exploits features

- Fast summing of Cal cell energies in towers (called Trigger Towers or TT)
- 0.2 x 0.2 in eta x phi
- CEM TT sums EM section (optional veto on HAD)
- CJT TT (TOT) sums projective tower exclude CH



L1 Muon Trigger

Trigger Object Report - Netscape

Name= **MUO** , Version= **2.00** , Use_Status= **used** , Current_Status= **current** . Created (Modified) by Gallas on 06-Jan-2002_18:00 (06-Jan-2002_18:00)

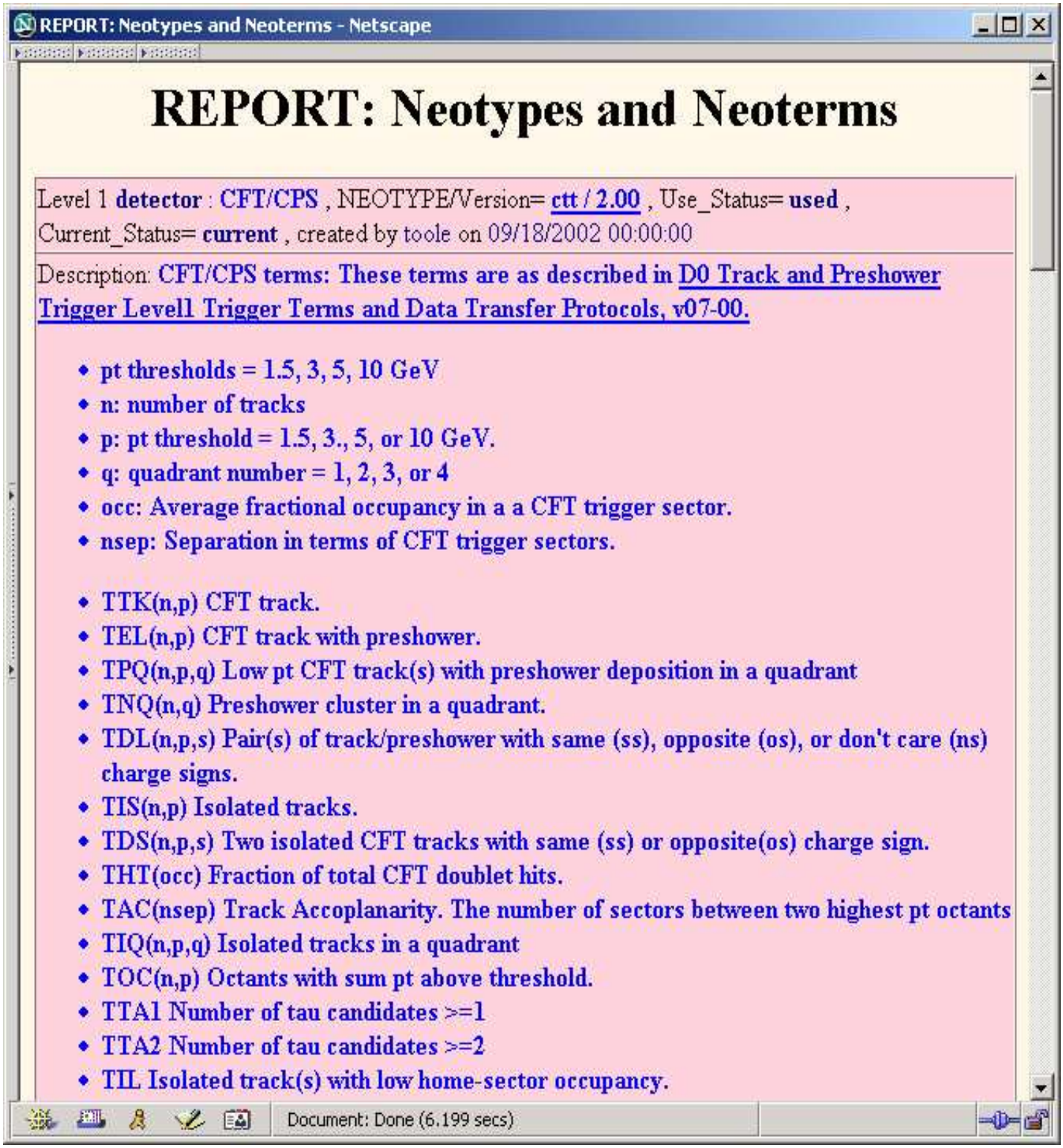
Description: **Muon global track combining CFT and/or Central Muon (PDT's and Scintillator) and/or Forward Muon (MDT's and Pixels).**

See Level 1 Muon Terms Description

order	name	type	Description
1	Mult	int	Muon track multiplicity. Possible values: • **0** == no tracks, • **1** == one track, • **2** == two tracks, • **3** == three tracks (generally not implemented but could be).
2	Pt	string	Pt (transverse momentum) threshold. Possible values: • **ptx** == no momentum selection (L1CFT not used), • **pt1** == pt1 of the L1CFT, • **pt2** == pt2 of the L1CFT, • **pt3** == pt3 of the L1CFT, • **pt4** == pt4 of the L1CFT.
3	Eta	string	eta (pseudorapidity) range. Possible values: • **C** == Central: |eta|<1.0 (central muon system only), • **W** == Wide: |eta|<1.5 (CFT system coverage), • **A** == All muon: |eta|<2.0 (muon system coverage), • **N** == North: eta between -1.0 and -1.5, • **O** == north: eta between -1.5 and -2.0, • **P** == north: eta between -2.0 and -1.0, • **S** == South: eta between +1.0 and +1.5, • **T** == south: eta between +1.5 and +2.0, • **U** == south: eta between +1.0 and +2.0, • **B** == Between: -2.0>eta>2.0 but not -1.0>eta>1.0. (forward muon system only)
4	Scint	string	L1CFT.and.scintillator quality (MTC05). Possible Values: • **L** == Loose, • **T** == Tight, • **X** == no requirement • **E** == Experimental.
5	Wire	string	Wire.and.scintillator quality (MTC10). Possible Values: • **L** == Loose, • **T** == Tight, • **X** == no requirement • **E** == Experimental.

Document: Done (2.764 secs)

L1 CTT Trigger



Audience Participation @ L1!

- Decode L1 neoterm name: CEM(1,5)
  - **Starts with a "C" -- Calorimeter**
  - **CEM (Sum Electromagnetic Trigger Towers)**
    - **CEM(n,Et[,Hv])**
  - **N = 1 – Requires ONE EM TT with**
  - **Et > 5 GeV and**
  - **No Hv – NO Hadronic veto**
- Decode L1 neoterm name: mu2pt3wtlx
  - **Starts with a "m" – Muon / (maybe CTT)**
    - **MUO(n,Pt,eta,scint,wire,option)**
  - **N = 2 – DIMUON**
  - **Pt3 – requires pt > 3rd CTT threshold**
  - **Region = 'w' – WIDE region (CFT coverage)**
  - **Scint = 't' – TIGHT req. on muon scintillator**
  - **Wire = 'l' – LOOSE req. on muon PDT/MDT's**
  - **Option = 'x' – no additional options**
- Decode L1 Script Name (seen in DAQmonitor)

TTK(2,3.)TTK(1,5.)_CEM(2,3)CEM(1,6)_ncu

L1: Whaaaaat's that ?

- '_ncu' – started appearing in L1 Script names for global_CMT-11.00
  - Cal_unsuppressed / 1
    - New trigger in it's own exposure group
    - Read out all Calorimeter cells unsuppressed
  - All other triggers were changed to veto on that L1 condition
- Other 'short names' used in L1 Scripts:
  - '_fz' – requires Afastz
  - '_nfz' – veto on Afastz

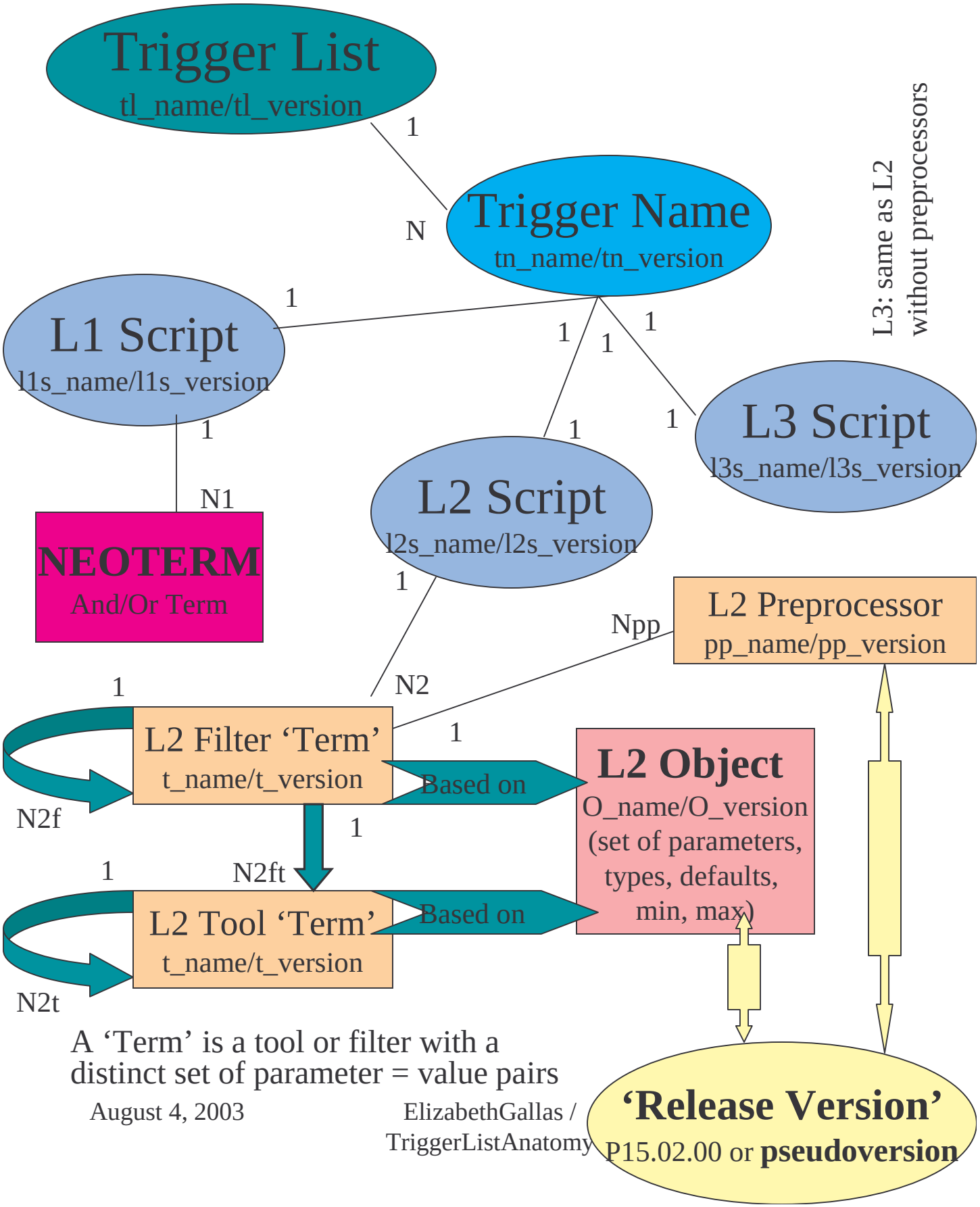
Trigger Nomenclature – L2, L3

- OBJECT
  - Has a distinct name
    - At Level 2: EM, JET … or at Level 3: L3TEle
  - Has a distinct set of parameter definitions
    - Name, type, default, min, max, description
  - Has a distinct type
    - TOOL or FILTER
    - Basis for all TOOL and FILTER TERMs (below)
  - Associated with one/more L2/L3 ‘releases’

- TOOL TERM
  - An instance of a TOOL type OBJECT giving values to each parameter
    - Aside: At L2, TOOLS depend on getting input from the L2 preprocessors in the Run
  - Can depend on other tools
    - Example: Jet finding TOOL uses clusters from a Cal Cell Clustering TOOL which uses Cell Energies unpacked by a Cal Unpacking TOOL
  - **Finds candidates** for other tools, filters
- FILTER TERM
  - An instance of a FILTER type OBJECT giving values to each parameter
  - Can depend on other filters
  - May find candidates for higher level filters
  - **Makes cuts on candidates**
  - For any event: result is TRUE or FALSE

- L2,L3 Script decision
  - **Logical AND of one/more FILTER TERMS**

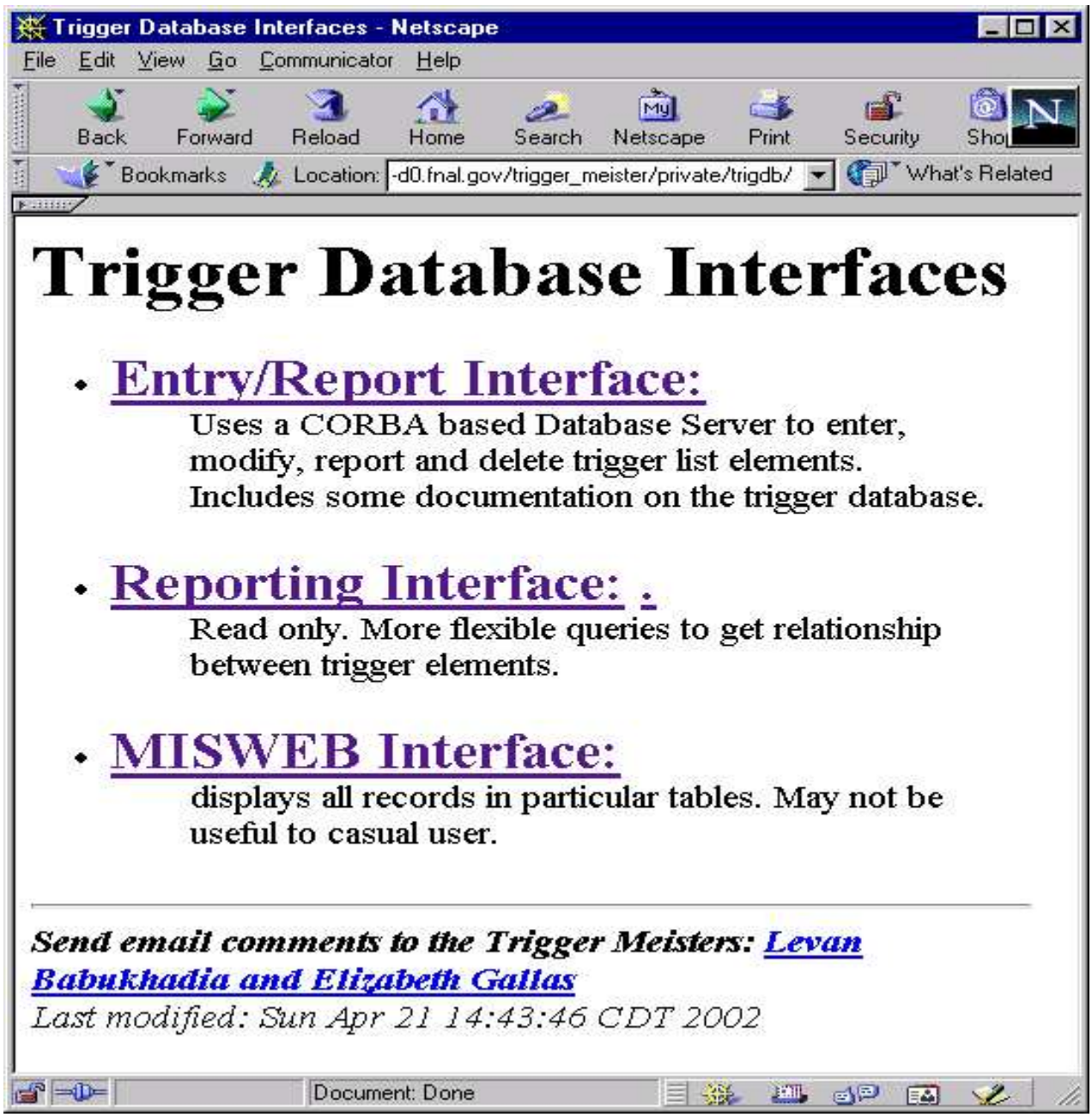
Trigger Database Design



A 'Term' is a tool or filter with a distinct set of parameter = value pairs

Trigger Database Interfaces

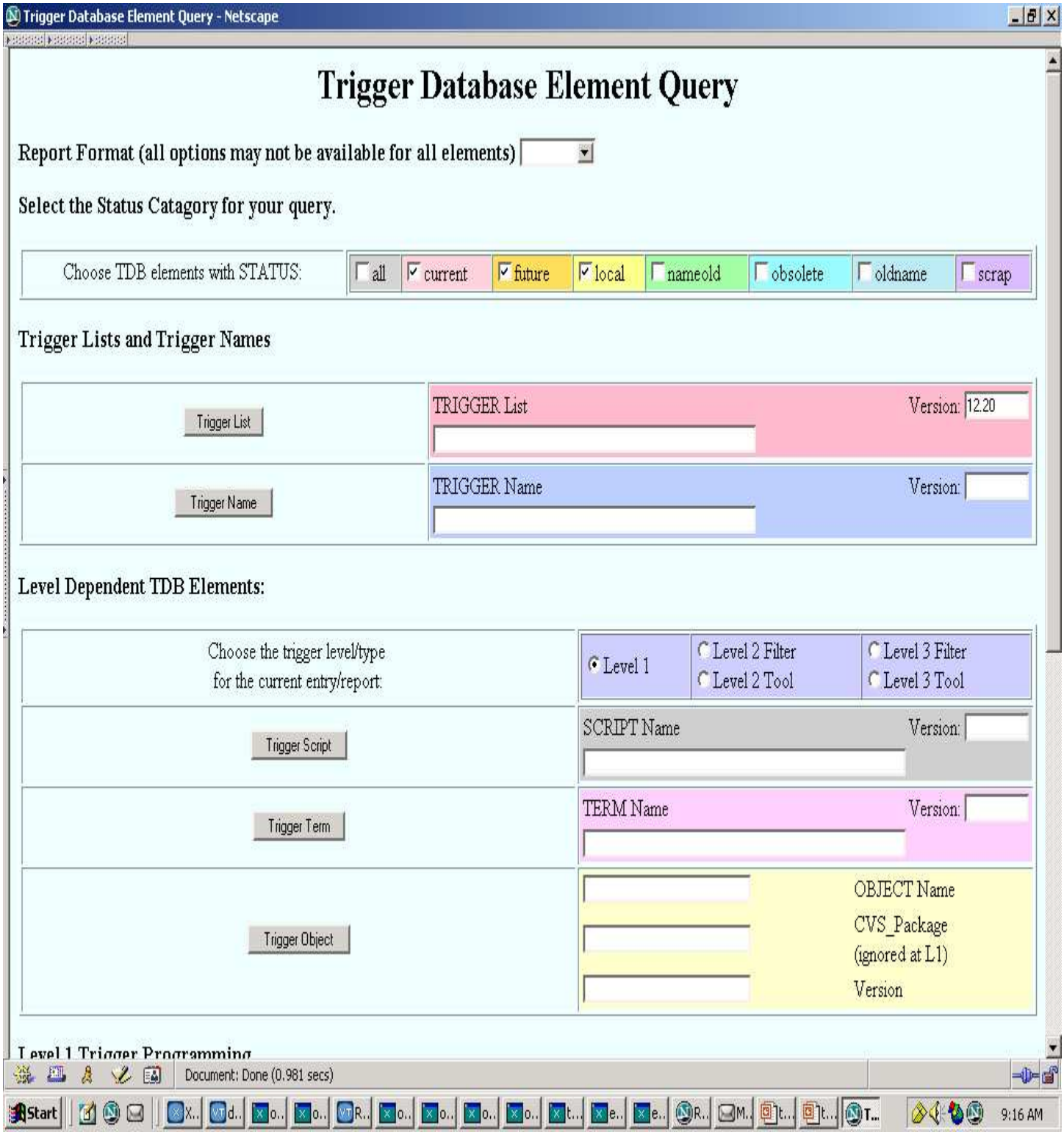
http://www-d0.fnal.gov/trigger_meister/trigdb/



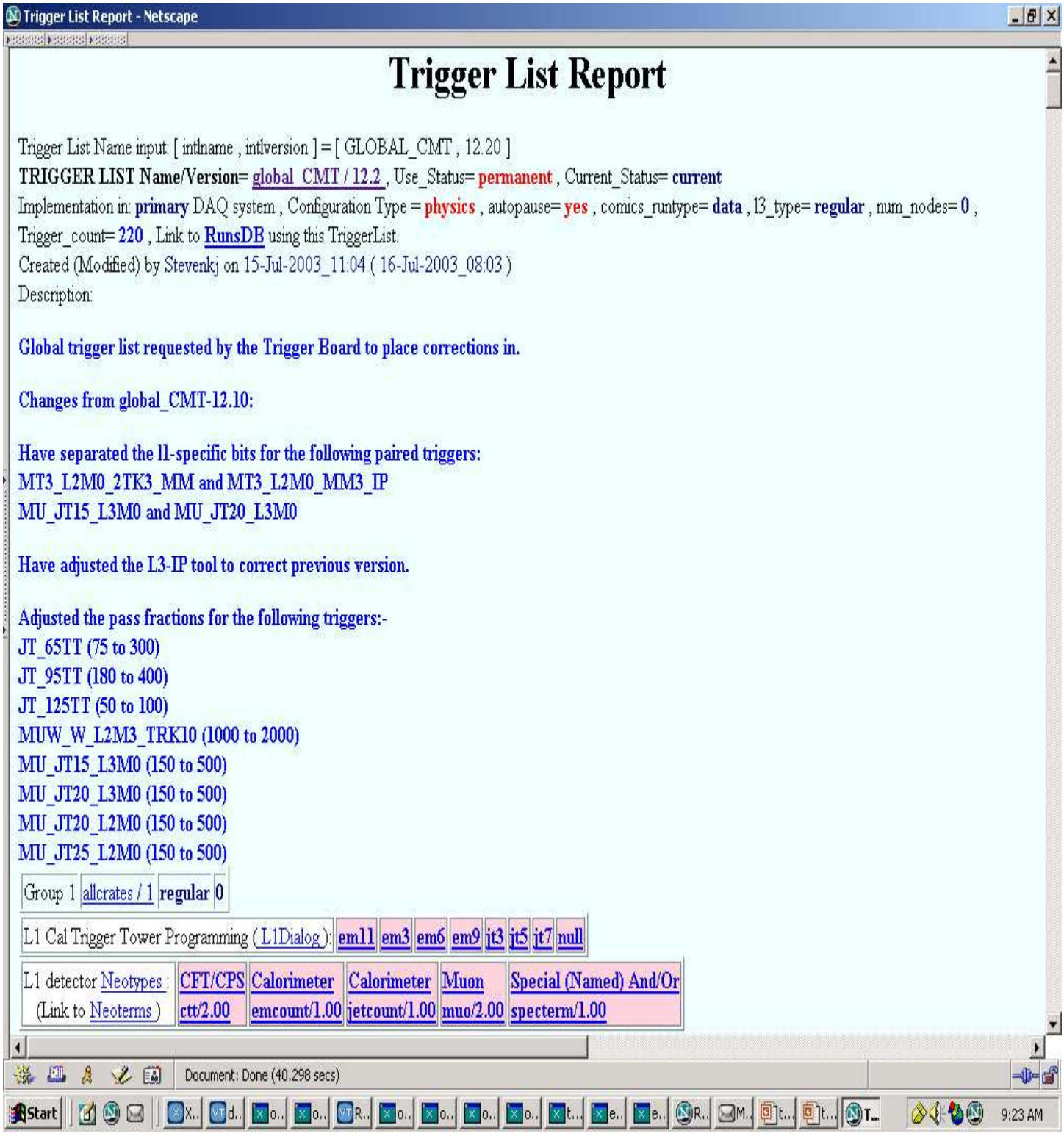
Trigger Database Entry Interface

- **Entry Interface:**
  - Used by experts to enter data.
  - Used by anyone (on DØ) to read data.
  - Currently the only interface with NEOTERM information (Level 1 And/Or Terms)
  - Help button points to existing documentation.
  - Has URL links into the Reporting Interface

Trigger Database Report Interface



Report: global_CalMuon-12.20 (1)



Trigger List Report - Netscape

Trigger List Report

Trigger List Name input: [intlname , intlversion] = [GLOBAL_CMT , 12.20]
TRIGGER LIST Name/Version= global_CMT / 12.2 , Use_Status= **permanent** , Current_Status= **current**
Implementation in: **primary** DAQ system , Configuration Type = **physics** , autopause= **yes** , comics_runtype= **data** , l3_type= **regular** , num_nodes= **0** ,
Trigger_count= **220** , Link to **RunsDB** using this TriggerList.
Created (Modified) by Stevenkj on 15-Jul-2003_11:04 (16-Jul-2003_08:03)
Description:

Global trigger list requested by the Trigger Board to place corrections in.

Changes from global_CMT-12.10:

Have separated the l1-specific bits for the following paired triggers:
MT3_L2M0_2TK3_MM and MT3_L2M0_MM3_IP
MU_JT15_L3M0 and MU_JT20_L3M0

Have adjusted the L3-IP tool to correct previous version.

Adjusted the pass fractions for the following triggers:-
JT_65TT (75 to 300)
JT_95TT (180 to 400)
JT_125TT (50 to 100)
MUW_W_L2M3_TRK10 (1000 to 2000)
MU_JT15_L3M0 (150 to 500)
MU_JT20_L3M0 (150 to 500)
MU_JT20_L2M0 (150 to 500)
MU_JT25_L2M0 (150 to 500)

Group 1	allcrates / 1	regular	0

L1 Cal Trigger Tower Programming (L1Dialog):	em11	em3	em6	em9	jt3	jt5	jt7	null

L1 detector Neotypes : (Link to Neoterms)	CFT/CPS ctt/2.00	Calorimeter emcount/1.00	Calorimeter jetcount/1.00	Muon muo/2.00	Special (Named) And/Or specterm/1.00

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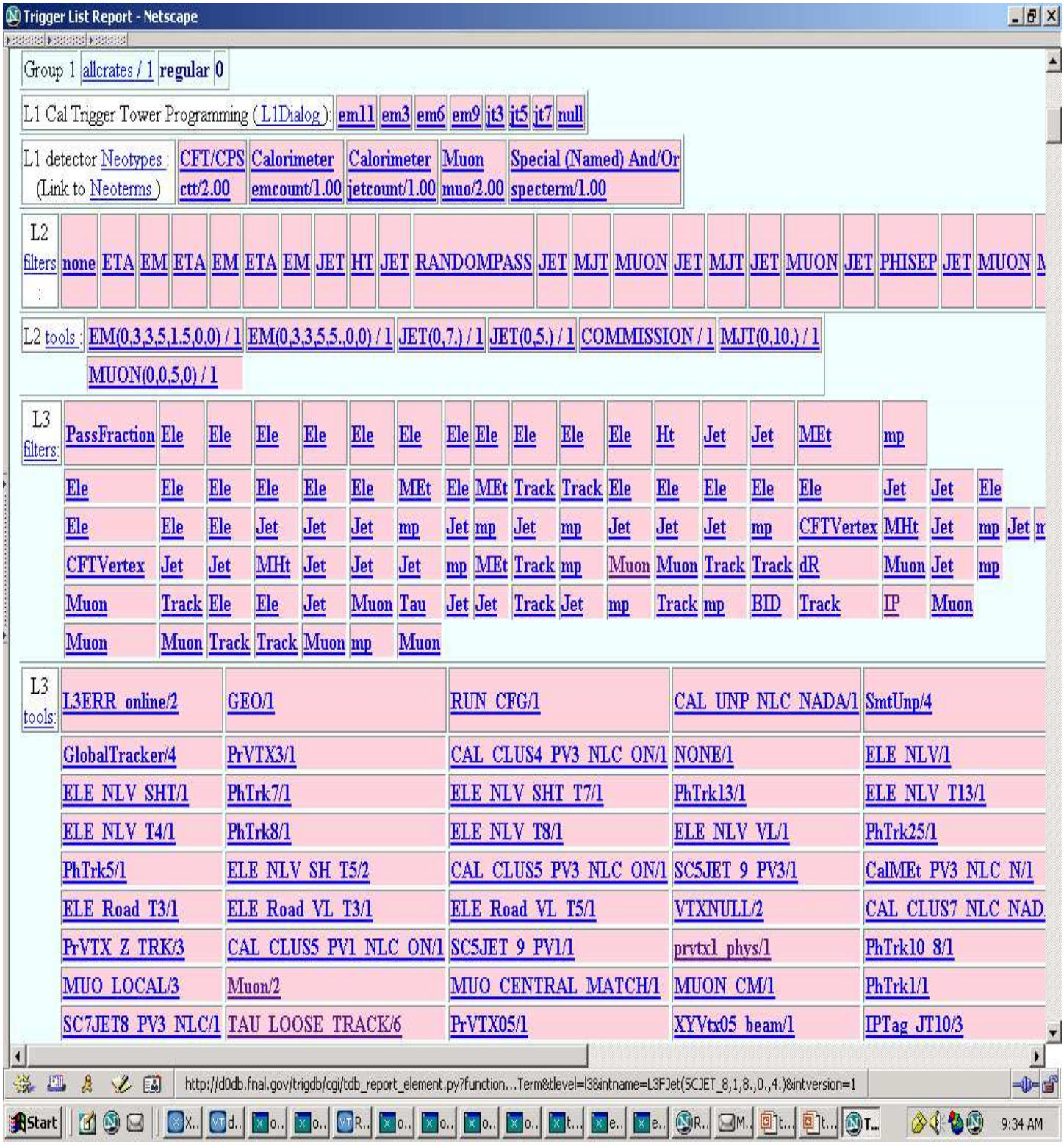
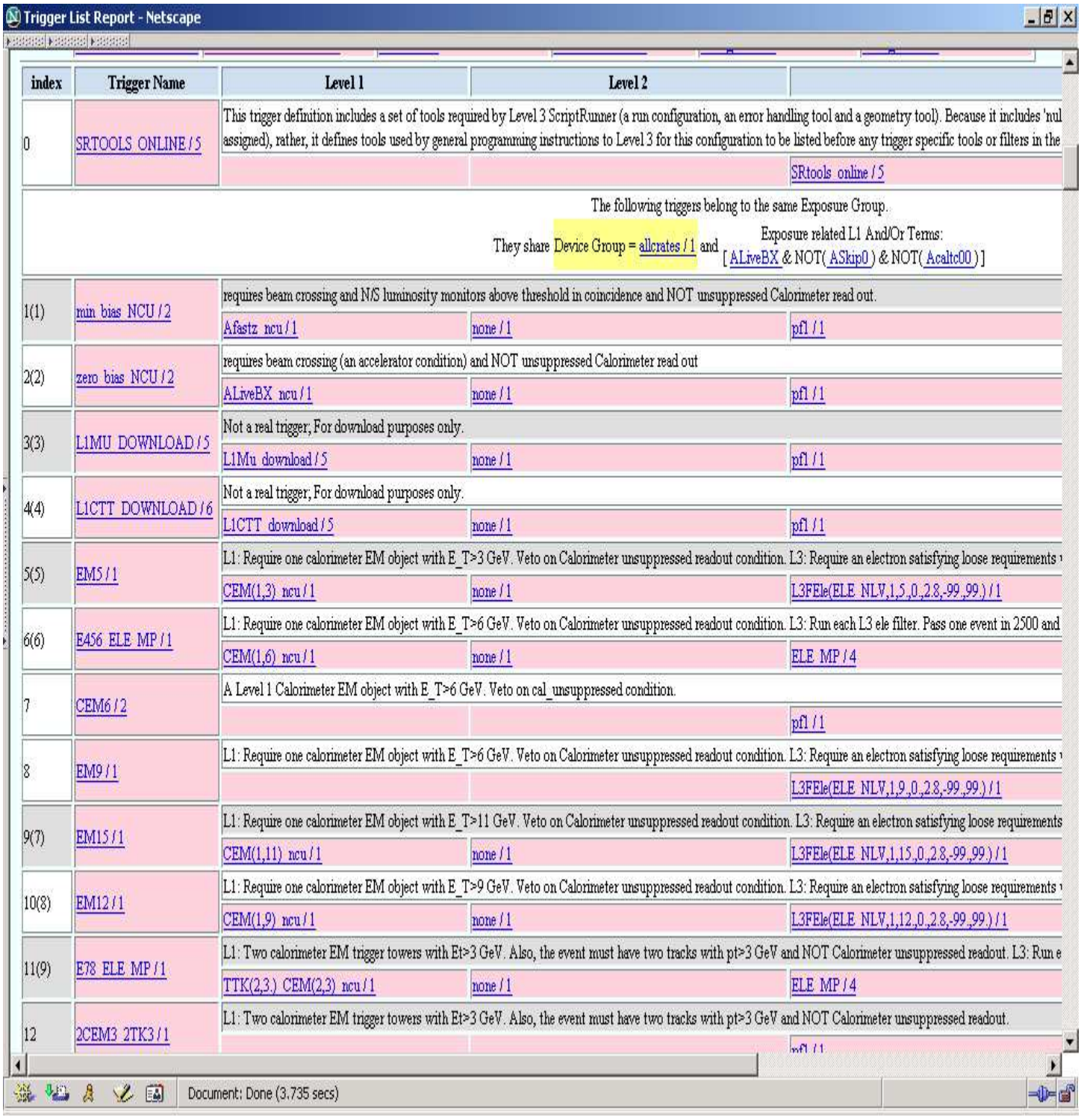
Start 9:23 AM

Report: global_CalMuon-12.20 (2)



Report: global_CalMuon-12.20 (3)



Trigger List Report - Netscape

index	Trigger Name	Level 1	Level 2	
0	SRTOOLS ONLINE / 5	This trigger definition includes a set of tools required by Level 3 ScriptRunner (a run configuration, an error handling tool and a geometry tool). Because it includes 'nul assigned), rather, it defines tools used by general programming instructions to Level 3 for this configuration to be listed before any trigger specific tools or filters in the		
				SRtools online / 5
		The following triggers belong to the same Exposure Group. They share Device Group = allcrates / 1 and Exposure related L1 And/Or Terms: [ALiveBX & NOT(ASkip0) & NOT(Acaltc00)]		
1(1)	min bias NCU / 2	requires beam crossing and N/S luminosity monitors above threshold in coincidence and NOT unsuppressed Calorimeter read out.		
		Afastz ncu / 1	none / 1	pfl / 1
2(2)	zero bias NCU / 2	requires beam crossing (an accelerator condition) and NOT unsuppressed Calorimeter read out		
		ALiveBX ncu / 1	none / 1	pfl / 1
3(3)	L1MU DOWNLOAD / 5	Not a real trigger; For download purposes only.		
		L1Mu download / 5	none / 1	pfl / 1
4(4)	L1CTT DOWNLOAD / 6	Not a real trigger; For download purposes only.		
		L1CTT download / 5	none / 1	pfl / 1
5(5)	EM5 / 1	L1: Require one calorimeter EM object with E_T>3 GeV. Veto on Calorimeter unsuppressed readout condition. L3: Require an electron satisfying loose requirements		
		CEM(1,3) ncu / 1	none / 1	L3FEle(ELE NLV,1.5,.0,.2.8,-99.,99.) / 1
6(6)	E456 ELE MP / 1	L1: Require one calorimeter EM object with E_T>6 GeV. Veto on Calorimeter unsuppressed readout condition. L3: Run each L3 ele filter. Pass one event in 2500 and		
		CEM(1,6) ncu / 1	none / 1	ELE MP / 4
7	CEM6 / 2	A Level 1 Calorimeter EM object with E_T>6 GeV. Veto on cal_unsuppressed condition.		
				pfl / 1
8	EM9 / 1	L1: Require one calorimeter EM object with E_T>6 GeV. Veto on Calorimeter unsuppressed readout condition. L3: Require an electron satisfying loose requirements		
				L3FEle(ELE NLV,1.9,.0,.2.8,-99.,99.) / 1
9(7)	EM15 / 1	L1: Require one calorimeter EM object with E_T>11 GeV. Veto on Calorimeter unsuppressed readout condition. L3: Require an electron satisfying loose requirements		
		CEM(1,11) ncu / 1	none / 1	L3FEle(ELE NLV,1.15,.0,.2.8,-99.,99.) / 1
10(8)	EM12 / 1	L1: Require one calorimeter EM object with E_T>9 GeV. Veto on Calorimeter unsuppressed readout condition. L3: Require an electron satisfying loose requirements		
		CEM(1,9) ncu / 1	none / 1	L3FEle(ELE NLV,1.12,.0,.2.8,-99.,99.) / 1
11(9)	E78 ELE MP / 1	L1: Two calorimeter EM trigger towers with Et>3 GeV. Also, the event must have two tracks with pt>3 GeV and NOT Calorimeter unsuppressed readout. L3: Run e		
		TTK(2,3.) CEM(2,3) ncu / 1	none / 1	ELE MP / 4
12	2CEM3 2TK3 / 1	L1: Two calorimeter EM trigger towers with Et>3 GeV. Also, the event must have two tracks with pt>3 GeV and NOT Calorimeter unsuppressed readout.		
				pfl / 1

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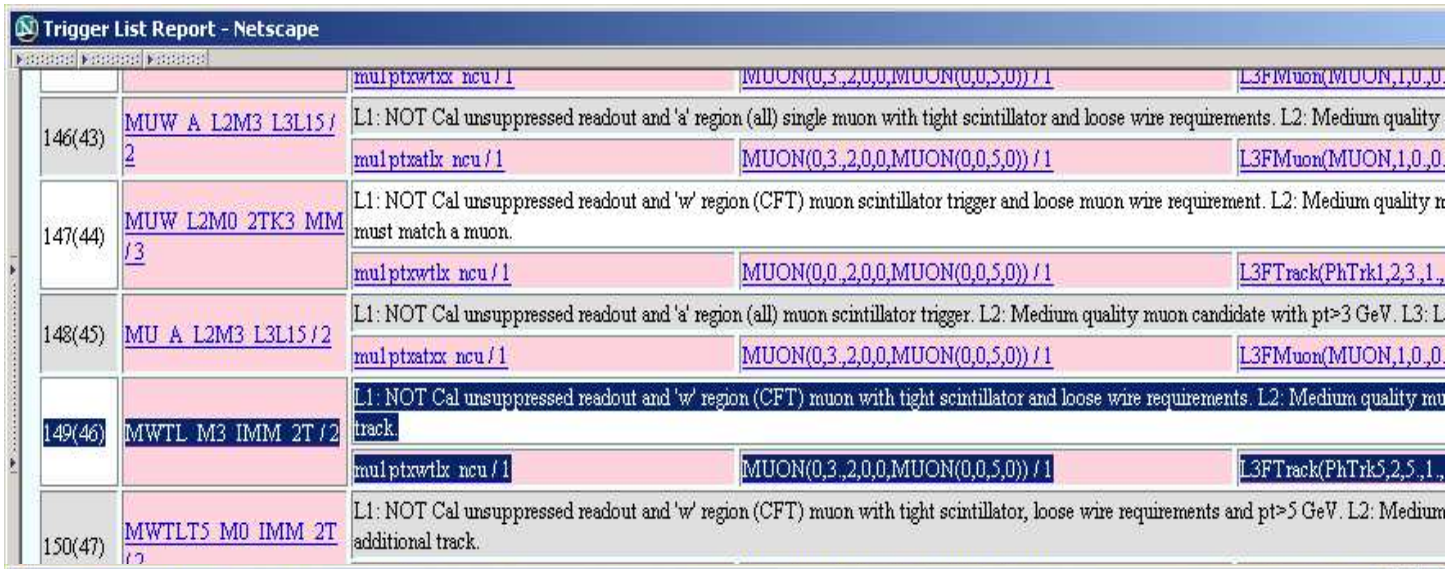
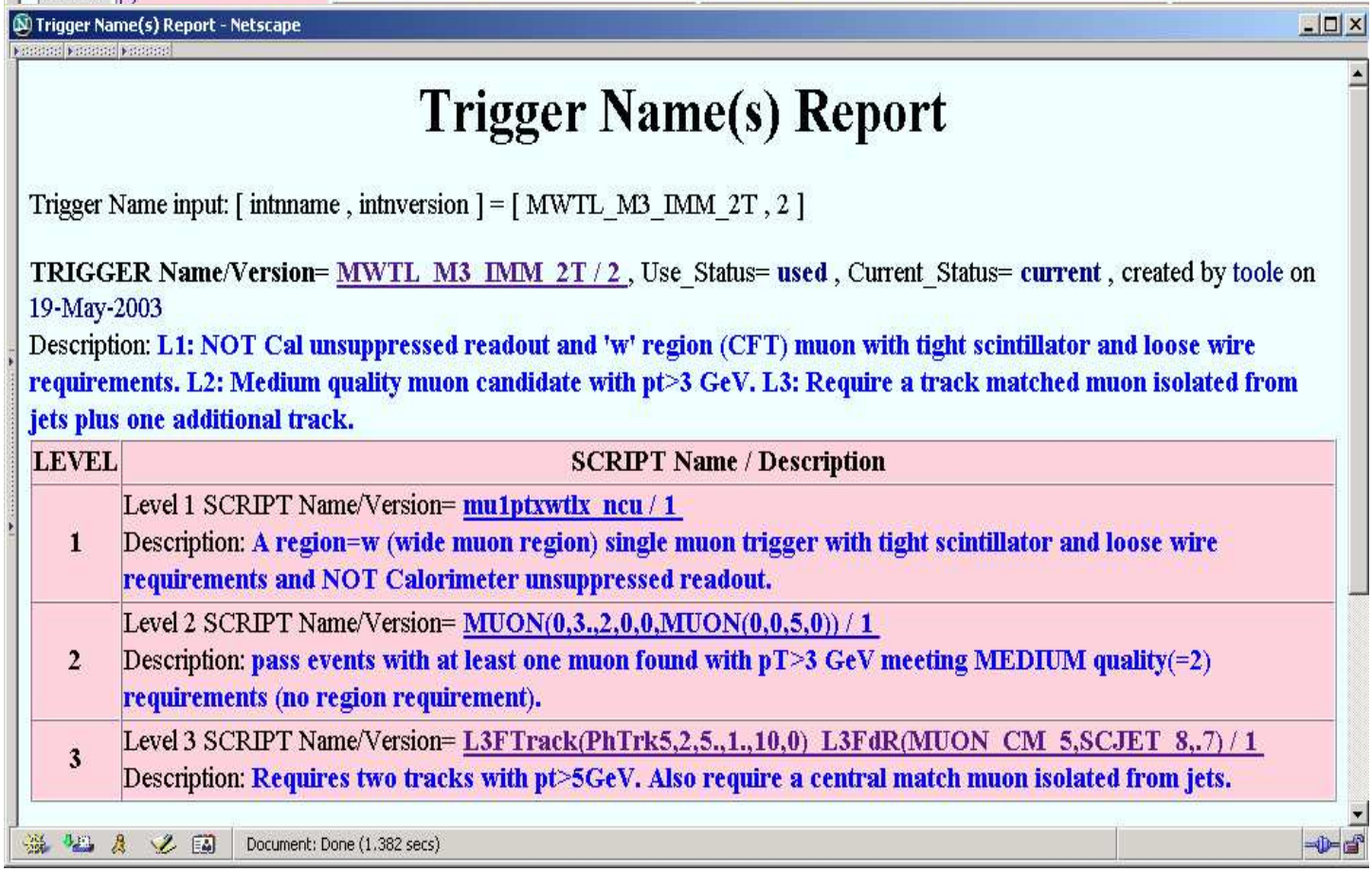
Two Triggers in every physics Trigger List

- zero_bias
  - Level 1 only trigger
    - Requiring NEOTERM ALiveBX
    - An accelerator based trigger
      - true on each of the 36 beam crossings of a single turn of the accelerator
      - About 1.7 M times per second
    - Used to cross check the luminosity measurement and trigger system functionality
    - Really is unbiased
- min_bias (‘minimum biased’)
  - Level 1 only trigger
    - requiring NEOTERM ‘Afastz’
      - (and ALiveBX and ASkip0) – every trigger
    - Based on Luminosity monitor:
      - North, South scintillator array on beamline
    - Requires N and S pulse heights above threshold in timing coincidence
    - Gives a quick measure of the z vertex
  - Necessary to measure luminosity
  - Is undoubtedly biased physics-wise

Example:
Trigger MWTL_M3_IMM_2T / 2





Example:
Trigger MWTL_M3_IMM_2T / 2

Trigger Script(s) Report - Netscape

Trigger Script(s) Report

Trigger Level: [slevel] = [l3]
Script input: [insname , insversion] = [L3FTRACK(PHTRK5,2,5.,1.,10,0)_L3FDR(MUON_CM_5,SCJET_8,.7) , 1]

SCRIPT NAME= L3FTrack(PhTrk5,2,5.,1.,10,0)_L3FdR(MUON_CM_5,SCJET_8,.7) / **1** , Version= **1** , Use_Status= **used** , Current_Status= **current** , created by toole on 19-May-2003
Description: **Requires two tracks with pt>5GeV. Also require a central match muon isolated from jets.**

ORDER	Includes Level 3 Filter TERM(s):
1	Term Name: L3FTrack(PhTrk5,2,5.,1.,10,0) / 1
2	Term Name: L3FdR(MUON_CM_5,SCJET_8,.7) / 2

Document: Done (1.061 secs)

Trigger Level 3 Term Report - Netscape

Trigger Level 3 Term Report

Term Name/Version= L3FdR(MUON_CM_5,SCJET_8,.7) / 2 , Use_Status= **used** , Current_Status= **current** , created by toole on 19-May-2003_10:04
Description: **require a muon with a central track match to be isolated by dR>.7 from all jet candidates with Et>8 GeV.**
is based on a Level 3 OBJECT name= L3FdR , CVS_package= **l3filters** , Version= **p15**

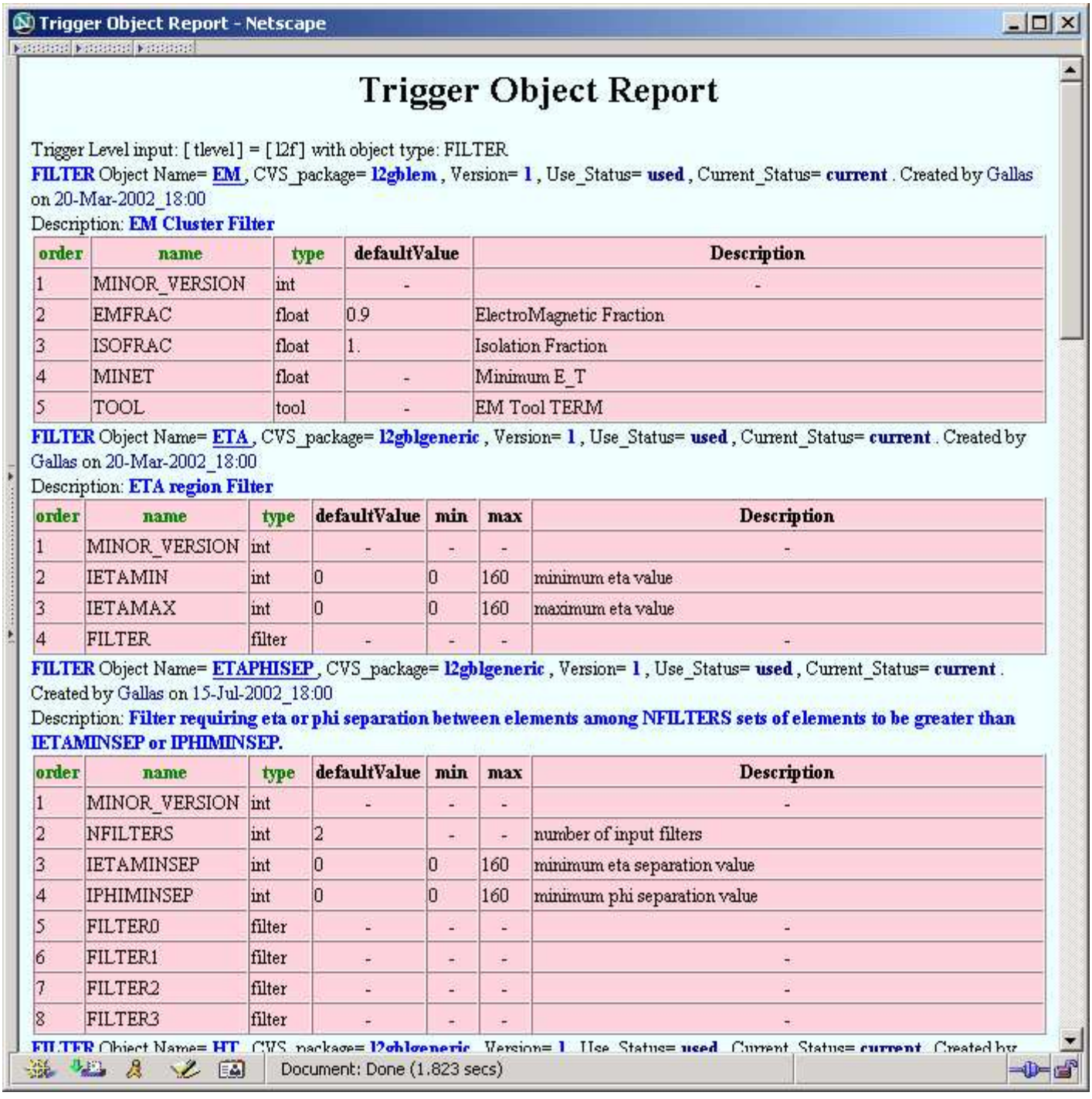
Order	Parameter	Type	Value	PVTVersion	Default
1	key1	filter	L3FMuon(MUON_CM,1,0.,0.,2.5,0.,5.,LOOSE)	1	-
2	key2	filter	L3FJet(SC7JET8_PV3_NLC,0,8.,0.,3.)	1	-
3	DR	float	.7	-	.7

Document: Done (1.192 secs)

List Current L2 TOOLS/FILTERS

- In Entry OR Report Interface:
  - Select ‘current’ status
  - Select ‘L2 tools’ or L2 filters
  - Click on ‘OBJECT’ button
  - Get a Report of all objects with descriptions and parameters…
- L2 Tools:
  - COMMISSION, EM, JET, MET, MJT, MUON
- L2 Filters:
  - EM, ETA, ETAPHISEP, HT, JET, MJT, MUON, PHISEP, RANDOMPASS, TIMEDELAY

Current L2 TOOLS/FILTERS from Trigger Database



Trigger Object Report - Netscape

Trigger Object Report

Trigger Level input: [tlevel] = [l2f] with object type: FILTER

FILTER Object Name= **EM** , CVS_package= **l2gblem** , Version= **1** , Use_Status= **used** , Current_Status= **current** . Created by Gallas on 20-Mar-2002_18:00

Description: **EM Cluster Filter**

order	name	type	defaultValue	Description
1	MINOR_VERSION	int	-	-
2	EMFRAC	float	0.9	ElectroMagnetic Fraction
3	ISOFRAC	float	1.	Isolation Fraction
4	MINET	float	-	Minimum E_T
5	TOOL	tool	-	EM Tool TERM

FILTER Object Name= **ETA** , CVS_package= **l2gblgeneric** , Version= **1** , Use_Status= **used** , Current_Status= **current** . Created by Gallas on 20-Mar-2002_18:00

Description: **ETA region Filter**

order	name	type	defaultValue	min	max	Description
1	MINOR_VERSION	int	-	-	-	-
2	IETAMIN	int	0	0	160	minimum eta value
3	IETAMAX	int	0	0	160	maximum eta value
4	FILTER	filter	-	-	-	-

FILTER Object Name= **ETAPHISEP** , CVS_package= **l2gblgeneric** , Version= **1** , Use_Status= **used** , Current_Status= **current** . Created by Gallas on 15-Jul-2002_18:00

Description: **Filter requiring eta or phi separation between elements among NFILTERS sets of elements to be greater than IETAMINSEP or IPHIMINSEP.**

order	name	type	defaultValue	min	max	Description
1	MINOR_VERSION	int	-	-	-	-
2	NFILTERS	int	2	-	-	number of input filters
3	IETAMINSEP	int	0	0	160	minimum eta separation value
4	IPHIMINSEP	int	0	0	160	minimum phi separation value
5	FILTER0	filter	-	-	-	-
6	FILTER1	filter	-	-	-	-
7	FILTER2	filter	-	-	-	-
8	FILTER3	filter	-	-	-	-

FILTER Object Name= **HT** , CVS_package= **l2gblgeneric** , Version= **1** , Use_Status= **used** , Current_Status= **current** . Created by

Document: Done (1.823 secs)

List Current L3 TOOLS/FILTERS

- In Entry OR Report Interface:
  - Select ‘current’ status
  - Select ‘L3 tools’ or L3 filters
  - Click on ‘OBJECT’ button
  - Get a Report of all objects with descriptions and parameters…
- L3 Tools:
  - L3T…BTagIP, CFTUnpack, CFTVertex, CalCluster, CalMEt, CalUnp, Ele, GlobalTracker, Jet, MuoCentralMatch, MuoLocal, MuoUnpack, Muon, NullVertex, CFTVertex, PhysTracker, SmtUnpack, XYVertex, TauHadronic
- L3 Filters:
  - L3F…BID, CFTVertex, Ele, Ht, FIP, Jacop, Jet, Met, MHt, MarkAndPass, Muon, PassFraction, PreScale, Tau, Track, dR

Current L3 FILTERS from Trigger Database

Trigger Object Report - Netscape

7	MaxEoverp	float	99.	-100.	100.

FILTER Object Name= **L3FHt** , CVS_package= **L3FHt** , Version= **p12.05.00** , Use_Status= **used** , Current_Status= **current** , Stream= **null** . Created (Modified) by Toole (Gallas) on 12-Nov-2002_18:00 (22-Nov-2002_18:00)

Description: **This is a scaler Ht filter. The transverse energy of candidates from filter1 and filter2 are summed to determine a scalar HT sum for the event. The filter is satified for an event if the HT sum is between MinHt and MaxHt. If filter1 and filter2 are equal, double the Ht thresholds !**

order	name	type	defaultValue	min	max	Description
1	filter1	filter	-	-	-	input filter providing candidates which contribute to the event total scalar Ht
2	filter2	filter	-	-	-	optional additional filter (if an additional filter is not required, set equal to filter1 and double the Ht thresholds !)
3	MinHt	float	5.	0.	500.	minimum scalar Ht satisfying this filter (double if filter1=filter2 !)
4	MaxHt	float	500.	10.	2000.	maximum scalar Ht satisfying this filter

FILTER Object Name= **L3FIP** , CVS_package= **l3filters** , Version= **p15.02.00** , Use_Status= **used** , Current_Status= **current** , Stream= **null** . Created by Toole on 15-May-2003_09:34

Description: **Cuts on the number of tracks above a specified impact parameter significance.**

order	name	type	defaultValue	min	max	Description
1	refset	tool	-	-	-	impact parameter tool
2	number	int	0	0	100	number of tracks
3	IP	float	0.	0.	20.	impact parameter significance
4	MinPt	float	.4	0.	100.	min pt of the tracks used.
5	MinXYHits	int	0	0	16	min number of x,y hits per track
6	MinZHits	int	0	0	16	min number of z hits per track

FILTER Object Name= **L3FJAcop** , CVS_package= **l3filters** , Version= **p12.05.00** , Use_Status= **used** , Current_Status= **current** , Stream= **null** . Created (Modified) by Gallas (Toole) on 24-Oct-2002_18:00 (11-Nov-2002_18:00)

Description: **L3FJAcop calculates and cuts on the angle between the two leading jets. The accepted events are those with MinAngle lt angle lt MaxAngle.**

order	name	type	defaultValue	min	max	Description
1	jets	filter	-	-	-	jet list
2	MinAngle	float	0.	0.	360.	min angle of 2 leading jets
3	MaxAngle	float	0.	0.	360.	max angle of 2 leading jets

FILTER Object Name= **L3FJet** , CVS_package= **l3filters** , Version= **p13.02.00** , Use_Status= **used** , Current_Status= **current** , Stream= **jet** . Created by Twyatt on 14-Nov-2002_18:00

Description: **filter object for selecting one/more jets with E_T and eta criteria**

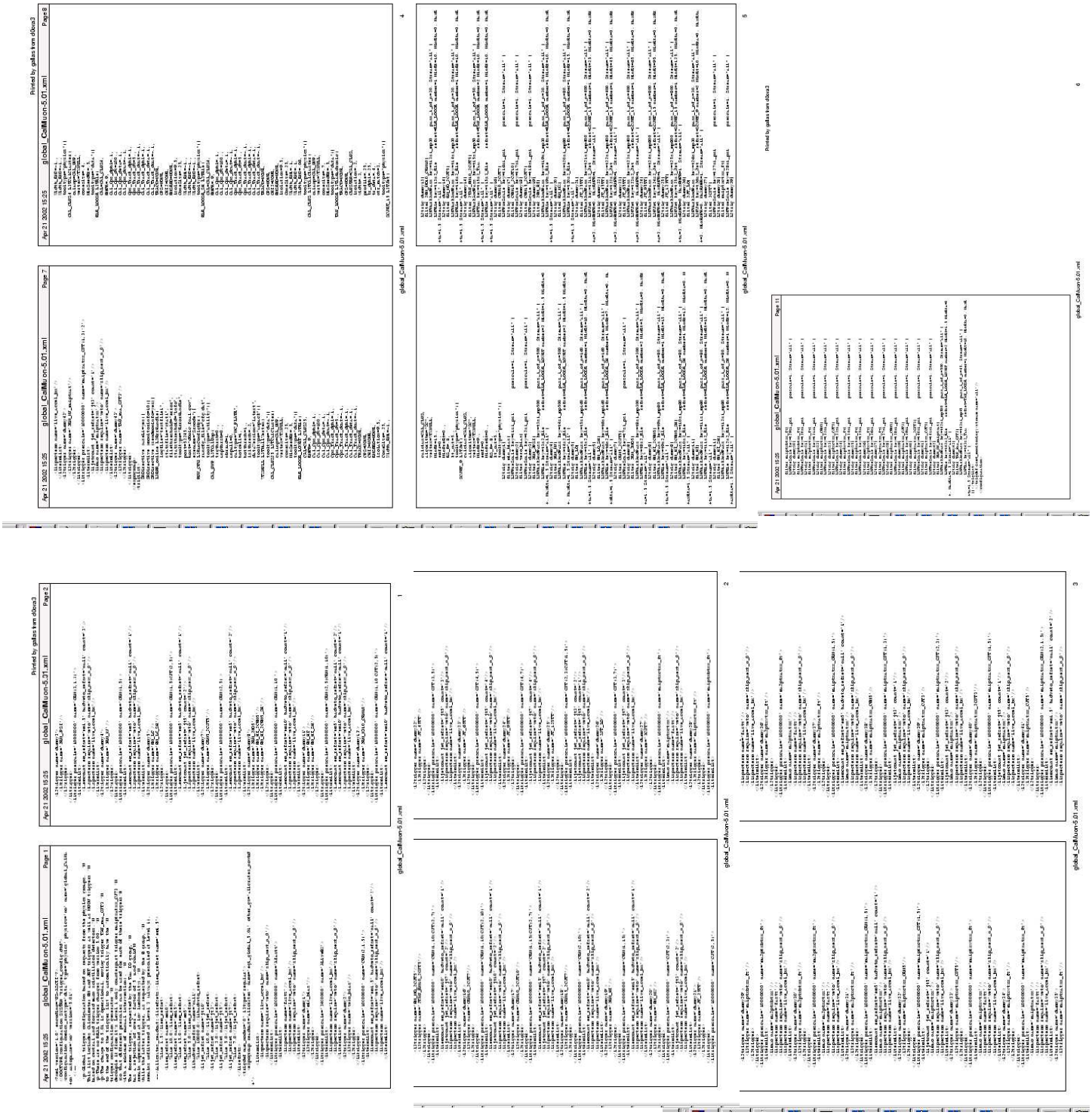
order	name	type	defaultValue	min	max	Description

Document: Done (2.284 secs)

L3: Whaaaaat's that ?

- Mark and Pass (special filter)
  - A Level 3 Filter designed to create samples for L3 trigger analysis (not for physics analysis)
  - Has one argument: pass_1_of_n
  - Action: puts 1 of every n events passing through it into the inclusive 'monitor' stream
  - Events written to the monitor stream are not intended for physics analysis
    - No luminosity accounting for monitor stream
    - Events recorded exclusively to the monitor stream events
      - do not get registered in the SAM event catalog
      - Cannot use 'pick events' utility to get them
  - Level 3 scripts using this filter have mp* in their name, where pass_1_of_n = *
- Other shortnames:
  - 'ps*' -- for L3FPrescale, prescale = *
  - 'pf*' -- for L3FPassFraction, fraction = *

TriggerList in 'xml'



You can generate TriggerList 'xml'

- Get trigger list name / version
- On d0mino (clued0?):
  - > setup d0cvs
  - > cvs co trigdb_xmlclient
  - > cd trigdb_xmlclient
  - > gmake
  - > source bin/xmlclient_setup
- Run the program with desired options
  - > For help:
    - > xmlgen.py (no arguments for help)
  - > global_CMT-12.20 for ONLINE:
    - > xmlgen.py -tlname global_CMT -tlversion 12.20 -file -OneStream all
  - > global_CMT-12.20 for Simulation:
    - > xmlgen.py -tlname global_CMT -tlversion 12.20 -file -Sim
- xmlgen.py in 'development'.
  - – To get latest version.
    - > gmake clean
    - > gmake

we hope to have a link on the web someday...

xmlgen.py -h

MANDATORY INPUT (wildcard %):

xmlgen.py --tlist-name listname --tlist-version version

OPTIONAL SETTINGS (the first 2 are most often used for online lists):

--OneStream all (to write all events to one stream like 'all')

--file (writes the xml to file named listname-version.xml)

--debug 0 (0 for debug mode (all levels), 1 for L1, 2 for L2, 3 for L3) (put this argument first if you want other input arguments reported)

--Sim

Chooses set of options typicalin offline simulation: including

--OneStream all

--GetCrates

--SRDirective useL1=no uses L3 tools script SRtools_sim/1 for L3 instantiation of the L3 error handling tool to write a logfile (port 0) called testfile1with typical simulation use file and stats thresholds does not include &smt_monitoring; (inserted for all online xml)

--UniqueL1L2 (generate unique L1/L2 names for all triggers, even if they share L1/L2 conditions)

--PrescaleFile (writes a default prescale file named listname-version-default.prescales)

--realNames (SR parser cannot handle realNames so use this option for testing only)

--NumNodes (number of l3 nodes to be used, overriding value in database (usually 0))

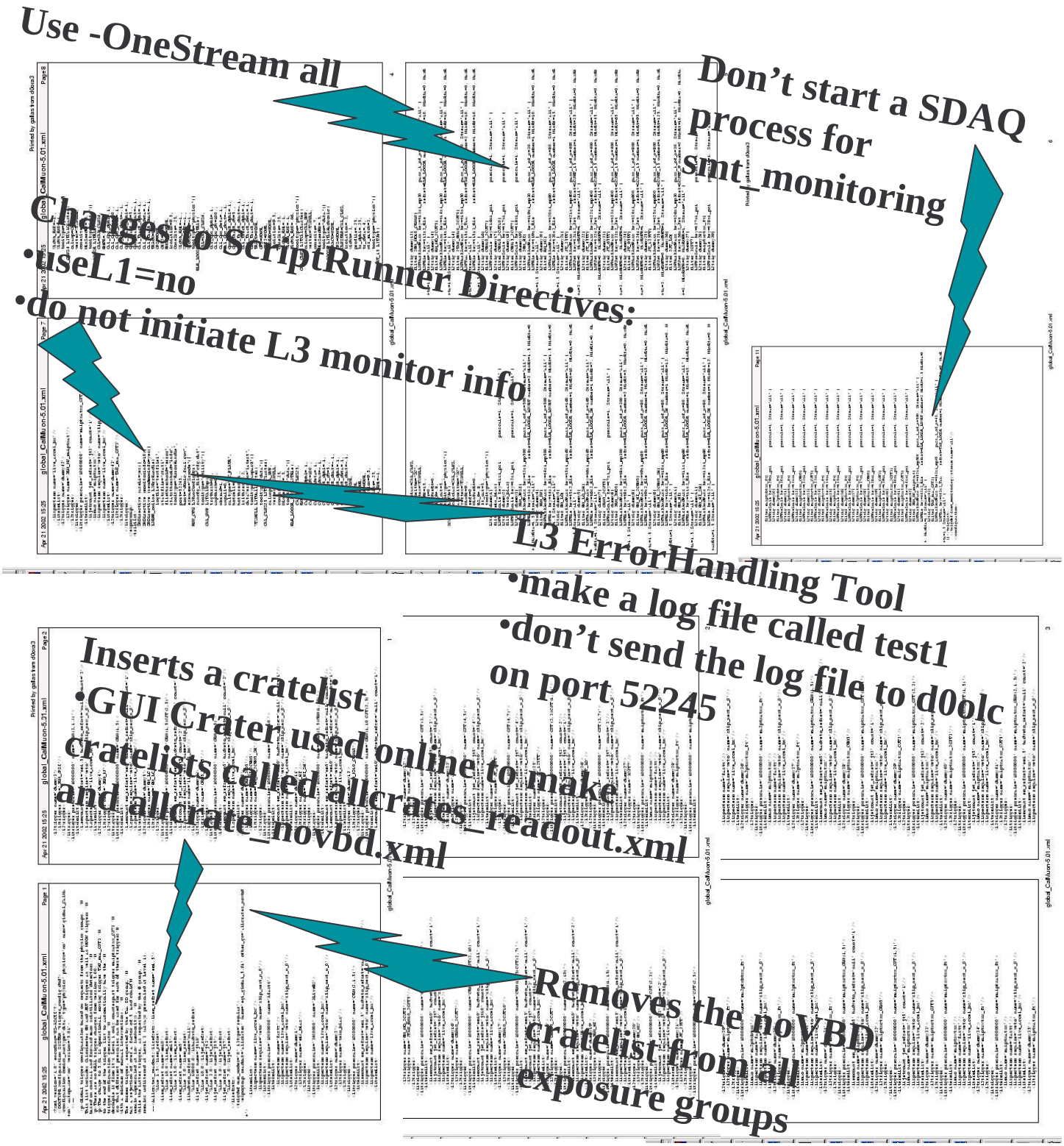
--SRDirective useL1=yes,monitorinfo=10,sendmoninfo=yes (is the current default)(enter a comma separated list of directives needed at top of the <triglist>)

--GetCrates (will generate real cratelists rather than use allcrates_readout.xml)

--Database (default is 'd0ofprd1')

--help (this help)

xmlgen.py --tlist-name global_CalMuon --tlist-version 5.01 --file --Sim



Trigger List Rules ...

Examples of rules for valid Triggers, Lists…

- all Trigger Names must
  - be unique (in that Trigger List)
  - len(TriggerName) ≤ 16 (thumbnail)
  - cannot contain special characters
- cannot use more than 4 Level1 Calorimeter EM or JET thresholds
- cannot use more than 32 L1 muon terms from the set of 256 valid terms
- cannot use more than 128 unique L1L2 bits
- L3 filters and tools mustn't use different versions of tools of the same name
- L3 filters and tools may call other tools, but tools may not call filters (not true at L2)
- L3 tool names must conform to SR parsing rules
- . . .

Many rules checked upon db entry, but the 'xml' generator checks many features as well ...

What is the Trigger Db NOT?

- **The Trigger Database is not designed to know about:**
  - Runs
  - Stores
  - Magnet settings
  - alignment
  - calibration
  - release version installed in L2 or L3
    (but may know about release compatibility)
  - time
- **Why not ?**
  - These other aspects of a Run are recorded in other databases or using other methods
  - The trigger database is an offline database
  - including ‘real time’ information would be an expansion in scope of the project

Trigger Database - Conclusion

- My usual apologies for any features not yet implemented or ‘perfected’:
  - reminder ...this is working system but is in many ways work in progress ...
    - ‘Option not Implemented’ messages
  - Documentation is in development…

- Elements of trigger configuration programming in many Trigger Lists are available via Trigger Db web interfaces.
  - ALL Global Lists since December 2001
  - MOST Special Run physics Lists
  - An increasing number of
    - Commissioning
    - Calibration
    - …

Trigger Database - FAQs

- Why are there 3 interfaces ?
  - there are different ways to access the database. Each interface has a specific function and/or takes advantage of the features available in that access mode
- Why is the TriggerDb in offline ?
  - needed in offline simulator and online
  - online security/access
  - design requires one repository because of the use of name/version convention at many levels
  - limited manpower
- Can I enter my own triggerlist?
  - Not without TM help.
  - The TM are ready to help you enter lists and generate/modify ‘xml’.

Trigger FAQs

- Why <50 ?
  - Keep the online system stable
    - Minimize dead time reduces complexity in luminosity measurement/accounting
      - L1 FEB (front end busy)
      - L2 Busy
      - L3 Disable
    - Absence of backlog/backpressure
    - able to handle subsystem variations without crashing
  - 50 is A LOT
    - finite time to reconstruct/re-reconstruct
    - Offline ‘skim’ uses only 30% of the data – why not throw away that 70% online?
    - Trigger Board needs to be smarter